

Application No.: 09/870226

Case No.: 54538US012

REMARKS

Claims 1-21 and 35-37 are pending. Claims 22-34 have been canceled. No claims have been amended or added.

The Invention

The present invention comprises a retroreflective article that has a structured front surface and an opposed back surface. The structured front surface comprises cube corner cavities. The walls of the cavities have a reflective film disposed on them. A transparent material fills the cavities. The transparent material may be an adhesive or a radiation curable material.

The structured front surface gives the article of the present invention its retroreflectivity. The front surface is, therefore, the surface upon which light impinges and is retroreflected.

The Rejections

Claims 15-18, 20, 21 and 35-37 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Chau et al. (U.S. 5,735,988) in view of Stamm (U.S. 3,712,706).

Claims 1-14 and 19 have been rejected under 35 USC § 103(a) as being unpatentable over Chau et al. in view of Stamm further in view of Rowland (U.S. 3,810,804).

Claims 1-21 and 35-37 have been rejected under 35 USC § 103(a) as being unpatentable over Rowland (US 3,810,804) or Rowland (US 5,376,431), collectively Rowland, in view of Stamm.

The References**Chau et al. (US Patent 5,735,988)**

Chau et al. is directed to, and discloses, a method for making an optical element used to provide collimated back lighting to a liquid crystal display. This reference uses a series of continuous linear features, such as linear peaks and grooves, that are coated with a reflective or refractive material to reflect a maximum amount of collimated light to the display. This reference

Application No.: 09/870226

Case No.: 54538US012

also discloses that an index matching fluid is applied over the reflection/refractive coating to fill the linear grooves.

Chau et al. states that any type of surface topography can be used to make the collimated backlight. However, Chau et al. provides no specific disclosure as to what type of other surface topography can be used. It is clear however, that any such other surface topographies are those that maintain the utility of the Chau et al. invention. That is, the other types of surface topography must be those that provide a collimated backlight.

Stamm (US Patent 3,712,706)

Stamm discloses an optical reflector that has cube corner cavities. The walls of the cavities are coated with a reflective material and then filled with an optically transparent material. The cavities are arranged in a close packed array. See Figure 1 and col. 2, lines 3-13, col. 3, lines 35-55, col. 5, lines 8-14 and col. 6, lines 38-45. Thus, Stamm discloses arrays of cube corner cavities that are immediately adjacent one another. That is, adjacent cavities touch one another. They are not separated from each other.

Rowland

Rowland discloses a retroreflective material that has a polymeric body having one surface that comprises cube corner projections and an opposite planar surface. A reflective coating is applied to the projections and an adhesive is applied over the reflective coating. Light impinges upon the opposed surface, passes through the polymeric body, and is reflected back through the body and the opposed surface by the reflective coating on the projections.

DISCUSSION

1. **The Rejection of claims 15-18, 20, 21 and 35-37 Over Chau et al. in View of Stamm.**

This combination of references does not establish a prima facie case of obviousness as there is no motivation to combine the disclosure of Stamm with the disclosure of Chau et al.

Application No.: 09/870226

Case No.: 54538US012

With regard to the Chau et al. reference, the Examiner asserts that it:

- a) Discloses a method of making a retroreflective article.
- b) Discloses at least partially filling the grooves between the linear peaks with a radiation curable adhesive.
- c) Suggests that it would be "well within the ordinary skill of one in the art" to use a retroreflective surface that comprises cube corner cavities in place of the projections taught by Chau et al.

Each of the Examiner's assertions is incorrect.

Retroreflective

Chau et al. does not disclose a retroreflective article. A retroreflective article is one in which incident light is returned to its light source on a path that is parallel, but in the opposite direction, to its initial direction. This return direction is sometimes referred to as an antiparallel direction. A retroreflective article has the characteristic that obliquely incident incoming light is reflected in a direction antiparallel to the incident direction, or nearly so, such that an observer at or near the source of light can detect the reflected light. (Applicant's specification at page 24, lines 28-31).

The continuous linear peaks and grooves of Chau et al. cannot retroreflect obliquely incident light. To the contrary, light that is obliquely incident to the planar surface of the index matching material (see reference no. 50, Figure 1F in Chau et al.), will be reflected obliquely from the faces of the linear peaks. The obliquely incident (i.e., incoming) light will not be reflected in a direction that is antiparallel to the incident direction. Consequently, the structure taught by Chau et al. is not retroreflective.

Adhesive

Chau et al. does not teach the use of an adhesive. Chau et al. only teaches the use of an index matching fluid to fill the linear grooves between the linear peaks. In fact, the only reference in Chau et al. to the use of an adhesive is at column 8, lines 11-12 where a pressure

Application No.: 09/870226

Case No.: 54538US012

sensitive adhesive is used to attach a submaster to a drum. This is evidence that Chau et al. knew what an adhesive was and that the inventors did not view the index matching material as an adhesive. Had Chau et al. believed that the index matching fluid was an adhesive, they would have referred to it as such.

Chau et al. disclose only one material, an acrylic based epoxy that may be used as the index matching material. This is nothing more than an identification of a class of polymers that can be used as the index matching material. Other polymers that may be used as the index matching material include polycarbonate, polymethylmethacrylate, etc. These materials are not considered to be an adhesive, even though they could be used as an index matching material. As a result, it is clear that the mere statement that the acrylic based epoxy is useful as the index matching material does not teach anything more than that.

It should also be noted that acrylic based epoxy materials by themselves would not be considered to be pressure sensitive by those skilled in the art. To the contrary, they would be considered to be materials that cure to a polymeric, non-pressure sensitive, non-adhesives state because of the epoxy functionality present. Such materials are neither inherently adhesive nor inherently pressure sensitive and the Examiner's assertion that they are is incorrect.

The "Suggestion" in Chau et al.

As noted above, the goal of Chau et al. is to provide a maximum level of collimated light to the liquid crystal display. See, for example, col. 3, lines 4-10 where collimating the backlight is taught as an effect of the invention. Also, see the claims where collimating light is a required element. Anything that would reduce the level of collimated light would be contrary to this goal and would be contrary to the teachings of Chau et al.

The substitution of the cube corner cavities of Stamm for the linear peaks of Chau et al. would not provide the collimated backlight of Chau et al. Rather than collimating light, that is returning the incident light rays as reflected rays that are parallel to one another, cube corner cavities would return the incident light rays back to the light source along an antiparallel path. This does not collimate the light.

Application No.: 09/870226

Case No.: 54538US012

Based upon the preceding discussion, it is clear that there is no motivation to combine Chau et al. and Stamm. Accordingly, the rejection of claims 15-18, 20, 21 and 35-37 over Chau et al. in view of Stamm.

The Examiner has also asserted that Chau et al. specifically teach that choosing the surface topography is well within the ordinary skill of one in the art. The Examiner urges that this provides justification for substituting cube corner cavities for the linear structures taught in Chau et al. The Examiner's argument is inappropriate.

The statements in Chau et al. at col. 5, lines 14-21 and col. 10, lines 1-5 must be read in the context of the invention in Chau et al. The entire thrust of Chau et al. is to collimate light. Thus, while there may be a number of structures other than the isosceles triangular prisms specifically taught by Chen et al. that can collimate light, any structure that does not collimate light would fall outside of the teachings of Chau et al. Cube corner cavities are such a structure.

It would not be obvious to combine Chau et al. with Stamm as suggested by the Examiner for this additional reason.

2. The Rejection of Claims 1-14 and 19 Over Chau et al. in View of Stamm Further in View of Rowland (U.S. 3,810,804)

The addition of Rowland '804 to the combination of Chau et al and Stamm does nothing to overcome the deficiencies of that combination. Thus, the Examiner has failed to establish a prima facie case of obviousness to support the rejection of these claims.

Applicant has shown that the combination of Chau et al. and Stamm is improper. Merely substituting the pressure sensitive adhesive of Rowland '804 for the index matching material of Chau et al. does not fix the deficiencies. There is nothing in Rowland '804 that would motivate one to take an action that is contrary to the goal of Chau et al. and replace a structure that collimates light with one that does not collimate light.

The reject of claims 1-14 and 19 over Chau et al. in view of Stamm further in view of Rowland '804 cannot be sustained.

Application No.: 09/870226

Case No.: 54538US012

3. The Rejection of Claims 1-21 and 35-37 over Rowland in view of Stamm

The combination of Rowland with Stamm does not establish a prima facie case of obviousness with respect to claims 1-21 and 35-37.

Rowland discloses to a structure in which light passes through the equivalent of the back surface of the present invention. Thus, rather than passing through an adhesive or a radiation curable material as is required in the present invention, light passes through the "body" of the structure, impinges upon the reflective layer of the projections and is reflected back through the body. It is also significant to note that Rowland nowhere mentions or suggest either the use of cube corner cavities on the impingement of light on cube corner cavities.

The Examiner argues that it would be obvious to substitute the cavities of Stamm for the projections of Rowland and that it would be obvious to have the light pass through the adhesive side of the article.

Applicants submit that the Examiner is incorrect. The suggested substitution would replace the cube corner projections of the back surface of Rowland with a cube corner cavity back surface. Light would still enter through the body portion of the "modified Rowland". As a result, the "modified Rowland" would not be what is claimed by Applicants as admitted by the Examiner.

To overcome this shortcoming, the Examiner argues that it would be obvious to further modify the "modified" structure of Rowland so that the cube corner cavities face the front surface of the "modified" structure to allow light to pass through the adhesive side of the article. Applicants traverse these arguments and submit that the proposed combination is not proper.

The combination proposed by the Examiner requires that the following three major changes be made to Rowland.

- 1) Replacement of the cube corner projections with cube corner cavities.
- 2) Filling the cube corner cavities with a transparent material.
- 3) Turning the structure so that the cube corner cavities face the front (i.e., light receiving) surface rather than the back surface.

Application No.: 09/870226

Case No.: 54538US012

This number of changes is not suggested by either reference. Rowland provides no basis for these changes as it only teaches a structure in which (a) light is transmitted through the front surface of a solid body having a retroreflective back surface of projections; (b) the light is then reflected off of a coating on the back surface of the structure; and (c) returned to the front surface of the structure. No cube corner cavities are contemplated in Rowland. Additionally, Rowland never contemplates that the light should ever pass through the adhesive.

Stamm also fails to provide any basis for making the necessary changes. Stamm only discloses that cube corner elements can be projections or cavities and that an optically clear material can be used to fill the spaces between the projections or the cavities. Stamm does not teach or suggest that this optically clear material can or should be either an adhesive or a radiation-curable material. Additionally, Stamm does not suggest that one should replace the projections of Rowland with cube corner cavities, reverse the orientation of that cube corner element so that it faces the front surface of the structure rather than the back surface of the structure and then provide a transparent fill that is either an adhesive or a radiation curable material in the cavities. To the contrary, nothing in Stamm suggests it would be of value to make such wholesale changes.

Based upon these comments it is clear that the rejection of claims 1-21 and 35-37 over Rowland '804 or Rowland '431 in view of Stamm cannot be sustained.

3. Other Arguments

It is respectfully submitted that a number of dependent claims are patentable over the references of record for additional reasons.

Claim 7.

This claim requires the presence of a transparent cover layer over the adhesive layer. This is a combination neither taught in, nor suggested by, any of the references. Moreover, none of the references suggest any reason to add a transparent cover layer.

Claims 10 and 11.

These claims require that the elastic modulus of the adhesive layer be lower than the elastic modulus of the body layer. Claim 11 further requires that the two moduli have certain

Application No.: 09/870226Case No.: 54538US012

values. These requirements are neither taught in nor suggested by any of the references.

Furthermore, none of the references suggest why the differences in moduli are of benefit.

Claim 14.

This claim requires the presence of a pressure-sensitive adhesive on the rear surface of the article. This is yet another requirement that is neither taught by nor suggested by any of the references.

In view of the preceding discussion, it is submitted that the application is in condition for allowance. Reconsideration of the rejections and allowance of all pending claims at an early date is solicited.

Respectfully submitted,

Date

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